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Pre-recruits immune system evolution of cuttlefish *Sepia officinalis* L. from different spawning sites of the English Channel.

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Introduction

Context

In spring, the European cuttlefish *Sepia officinalis* L. migrate, in the English Channel, from the open sea to the coast to lay their eggs. After hatching, juveniles remain on the coast until the autumn before leaving towards the recruited central stock (Boucaud-Camou et Boismery, 1991).

Studying the juvenile performances in the various spawning sites is thus necessary to understand the renewal of this resource.

Which habitat contributes the most to the central stock?
Should we make protected zones for a better recruitment durability?

Antimicrobial defence of invertebrates

Lysozyme, one of the most common lysosomal enzymes, acts non-specifically against a wide range of foreign invaders. External aggressions (infection, injury etc.) induces its synthesis. Antiproteases (protease inhibitors) aid in the organism defence by inhibiting the activities of potentially destructive proteases (Malham et al., 1997).

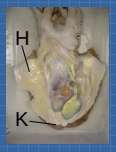
These components of immunity are used as indicators of the effect of external factors such as diet or diseases (Le Bihan, 2006).

Objective

The aim of this work was to adapt the enzyme assays to juveniles and then study the impact of different spawning sites from the English Channel coasts on the hatchling immune system development in the early life stages.

Material and methods

Cuttlefish organs

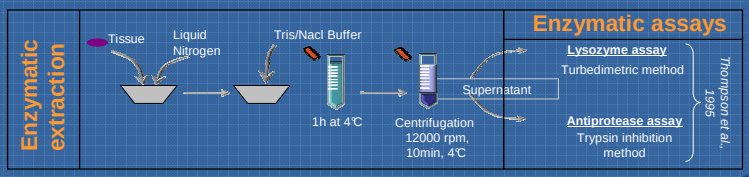


A- Radula
B- Branchial Heart Appendage
C- Branchial Heart
D- Central Heart
E- Posterior Salivary Gland
F- Optic Lobe
G- White Body
H- Mantle
I- Stomach
J- Cecum
K- Skin
L- Digestive Gland Appendage
M- Digestive Gland
N- Gills

Juvenile Cuttlefish and eggs

WILD: Pre-recruits and eggs were collected from the different spawning sites

EXPERIMENTAL: Juveniles hatched from the wild eggs were reared in a semi closed system for physiology comparison. Juveniles from the different sites were reared in the same abiotic and biotic conditions.



Results

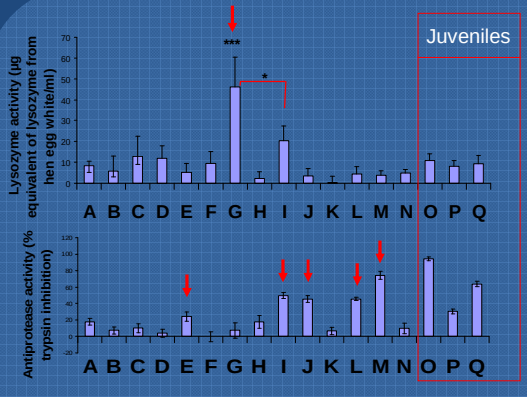


Figure 1: Lysozyme and antiprotease activity in different organs and in juvenile of cuttlefish *Sepia officinalis* L. O: juvenile body, P: juvenile head and Q: whole juvenile.

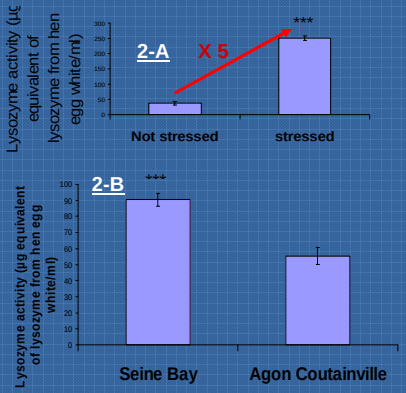


Figure 2: Lysozyme activity in eggs and pre-recruits of cuttlefish *Sepia officinalis* L. **2-A:** Lysozyme activity induced after eggs transport stress. **2-B:** Site impact on pre-recruits immunity

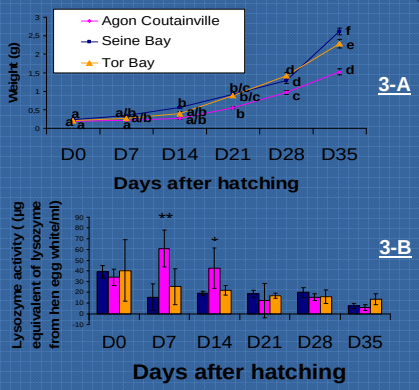


Figure 3-A: Experimental growth survey of cuttlefish juveniles from 3 different spawning sites.
Figure 3-B: Lysozyme activity in cuttlefish juveniles from 3 different spawning sites.

Conclusion and perspectives

- Lysozyme assays on organs revealed its specific presence in the white body where haemocytes (immune cells) are synthesized
  Antiprotease is localized in the digestive organs thus is not specific for immune system when measured on whole juvenile body
- Lysozyme assays on wild eggs and pre-recruits and on experimental growth survey showed specific responses to the organism physiology state though being a good indicator of immunity in the early life stages of cuttlefish *Sepia officinalis* L.
- Phenoloxydase assays will complete the immunity approach made on juveniles.

Cited literature

Boucaud-Camou, E. et Boismery, J. (1991). The migrations of the cuttlefish (Sepia officinalis L.) in the English Channel. In 'the cuttlefish'. *University of Caen*, pp. 179-189.

Le Bihan, E., 2006. Valorisation des co-produits issus de la pêche des céphalopodes : application à la seiche *Sepia officinalis*. Thesis, University of Caen, France, 285 p.

Malham, S.K., Norman, W.R. and Christopher, J.S. (1997). Lysozyme and antiprotease activity in the lesser octopus Eledone cirrhosa (Lam.) (CEPHALOPODA). Developmental and Comparative Immunology 22, 27-37.

Thompson, I., Choubert, G., Houlihan, D.F. and Secombes, C.J. (1995). The effect of dietary vitamin A and astaxanthine on the immunocompetence of rainbow trout. Aquaculture 133, 91-102.